

OPERATIONAL ASPECTS OF E-COMMERCE IN MANUFACTURING COMPANIES OF INDIA

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Most of the studies on e-commerce have focused on advanced economies while no attempt seems to have been made to examine the operational aspects of e-commerce in a developing economy. The present study attempts to identify some of the operational aspects of e-commerce in the manufacturing sector of India. A pre-structured questionnaire has been used to collect information from 90 large manufacturing firms in India. It has been observed that almost all firms use computer networks for various activities. Most of them utilize these networks for B2B and B2C transactions. There are certain issues such as cost, speed, connectivity, security and investment that need to be addressed to exploit the full potential of e-commerce in India.

Key words: E-Commerce, Manufacturing, India

JEL classification: L81, L60

1. Introduction

In modern era, the powerful 'information technology' has created great values for business units in a variety of ways. E-commerce, one of its applications, involves the use of internet to transact business. It includes all activities involving exchange of value across organizations or individuals in return for products and services with the help of digital technology. The advent of e-commerce has affected almost all the components of a business system throughout the world. It has enhanced the ability of the organizations in all the industries to efficiently manage supply and value chain, customer relationships, links with business partners, manufacturing and distribution systems. E-commerce has led to disappearance of geographic boundaries, bringing firms and customers closer to each other. It allows organizations to be more efficient by reducing their administrative costs and cycle time, streamlining business processes, and utilizing the resources optimally irrespective of their location.

According to Forrester Research Inc. (2001)³, the B2B and B2C transactions through

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³ Available at www.forrester.com.

e-commerce totalled US\$657 billion in 2000, surging to US\$6.8 trillion in 2004. North America's e-commerce was expected to top the list of regions in both 2000 and 2004, registering US\$509.3 billion and US\$3.5 trillion respectively. Jupiter (2001) estimated that, in 2005, 80 per cent of B2B transactions, accounting for US\$6.3 trillion, would be in e-commerce mode. The Indian Market Research Bureau (1999) observed that the market size of B2B e-commerce was approximately ₹50,000 crore in 2001 in India. During 2004-2005, the total value of e-commerce activities within India has exceeded US\$130 million. It is expected to grow at 300 per cent plus during the next couple of years.

The present study identifies the operational aspects of e-commerce in large manufacturing firms in India. It also examines the extent to which e-commerce initiatives have been undertaken by these enterprises. The paper has been organized into five sections. The present section, Section I, gives the introduction. Section II reviews some of the existing empirical works. Section III describes the methodology used to collect the data. Section IV presents major findings and discussion. Finally, Section V gives main conclusions of the study.

2. Literature Review

E-commerce has been an emerging area of research in recent years. Some of the studies (for example, Carr, 1985) examined the changes brought out by the information technology in planning, developing and structuring the traditional data processing systems in the organizations. A few case studies (Kosiur, 1997) have been made to analyze the performance of the firms which switched over to e-business.

E-commerce can be beneficial to the firms. With this thinking in mind, Miller (2000) conducted a survey of 184 US firms in different industries with the help of a questionnaire to find out about their e-commerce activities. Approximately 90 per cent of the large companies and 6 per cent of the small ones in his sample had their own website.

PRTM, Washington², conducted a study in 1999 to identify the e-business applications in sales and marketing management. The responding executives belonged to a cross-section of industries. It was observed that in 66 per cent of the firms, customer service was the main goal of e-business. 85 per cent of the respondents regarded e-business strategy as important to their marketing and sales success. 79 per cent of them expected their e-business contacts with customers via the internet to build loyalty only if supported by other media and personal

² PRTM adopted from Miller, Richard K. (2000)

interaction.

The Thomas Register and Visa, USA,³ conducted a survey of 3,000 purchasing executives working in manufacturing, government, construction and engineering industries. They revealed that about 25 per cent of the executives purchased between US\$1,000 and US\$10,000 worth of goods per month via internet. Moreover, 8 per cent of the respondents purchased more than US\$10,000 worth of goods per month over the net.

Pricewaterhouse Coopers (2001)⁴ contacted 78 large manufacturing corporations in the United States to identify the use of online system for conducting business. It found that only 40 per cent of large companies received orders online and only 28 per cent accepted payments online. These companies, however, believed that the portion of their revenue from e-commerce would jump from less than 5 per cent to at least 20 per cent by 2003.

Indian Market Research Bureau (2000)⁵ conducted a survey on the status of e-commerce in India covering 360 decision makers in business, and 2000 households, besides a few pioneers in the field. The study observed that approximately 12 per cent of the turnover of the firms was likely to be contributed through the e-commerce in next two years. 73 per cent of the companies covered had a website and 25 per cent had a home page. Advertisement and product display/catalog were major uses of the web site.

Ghosh (2000) conducted a survey of some of the companies using e-commerce in India. He found that majority of the firms considered e-commerce as an important part of their corporate strategy. Companies were giving senior level support and were budgeting resources to support to its adoption and implementation. However, lack of electronic payment facilities and limited technologies used by trading partners (some of them were not even networked) hampered the adoption of e-commerce across the entire supply chain. The survey further revealed that the top executives believed that e-business would have significant impact on their industry in future.

Confederation of Indian Industries and International Trade Centre (2001) conducted a survey of 269 small and medium organizations to find out the level of e-commerce activity in India in 2005. The study revealed that e-commerce in India is expected to increase to ₹25,200 crore in 2005 from ₹450 crore in 2000. B2B e-commerce dealings are expected to increase

² PRTM adopted from Miller, Richard K. (2000)

³ Thomas Register & Visa, USA adopted from Piturro, M.(1999)

⁴ Pricewater cooper adopted from Taylor David and Terrtlune Alyse (2001)

⁵ IMRB (2000) adopted from Mittal D.P. (2000)

from ₹400 crore in 1999-2000 to ₹23,280 crore in 2004-05. The total worth of B2C activities in India is likely to go up from ₹50 crore in 2000 to ₹1,882 crore in 2005.

Internet and Online Association of India (2005) conducted research in association with Cross Tab Marketing Services to track internet user's activity for shopping online. They solicited the views of 3099 respondents. More than one half (55 per cent) of them had shopped online. The study found that 85 per cent of online shoppers were male. About one-third of the respondents had started shopping online in the last 12 months. Maharashtra, Delhi and Tamil Nadu had the highest number of e-shoppers. Mumbai held the top slot for every category of products, except jewelry. Four-fifths of the shoppers are 'highly satisfied' or 'satisfied' with online shopping experience.

Thus, a number of studies have been conducted on various aspects of e-commerce. However, most of them have been made in advanced countries. Moreover, the work covering operational aspects of e-commerce are limited in number. The present study attempts to bridge this gap and deals with the operational aspects of e-commerce in large manufacturing companies in India. An attempt is also made to find out the extent to which e-commerce initiatives have been undertaken by these companies. The study also intends to analyze the impact of these e-commerce developments on various activities of the organization.

3. Methodology

To begin with, 150 manufacturing companies were selected at random from the list of Economic Times Top 500 Companies and were further cross-checked from the Bombay Stock Exchange Official Directory. A structured questionnaire designed specifically for the purpose- containing both open and close-ended questions - was mailed to these companies after pilot testing is done with ten companies. The response received was not satisfactory. Consequently, rather than a postal follow-up, the registered offices/factory locations of the companies in Delhi and its adjoining areas, Kolkata, Chennai and Mumbai were personally visited. During the course of discussions with some of the executives, a few more companies characterized with preferred sample characteristics and actively pursuing e-commerce initiative came to be identified. In the process, the sample got enriched by inclusion of 20 such companies that were seriously pursuing e-commerce, albeit, they were not members of Top 500 Club. The corporate executives, mainly, Heads of the IT Department, were contacted and the information was collected after personal discussions with them on the basis of the questionnaire. In all, 104 questionnaires were filled up.

Further, it deemed fit to supplement the primary data collected with the secondary data in respect of company-related characteristics. For this, recourse was taken to 'Prowess' database⁶. Sample-database match-making showed that the secondary data was available only for 90 companies out of the 104 covered in the primary study. As a result, analysis is done only for 90 large manufacturing companies from different parts of India. The information collected is analyzed using simple frequencies, percentages, cross-tabulation of various personal and company variables and chi-square test. The parameters for segregative analysis are as follows:

1. *Respondent-Characteristics*: Age, Total Experience, Present Experience, Qualification, Specialization, and Computer Education.

The information about respondent characteristics is obtained at the time of filling of questionnaire. These background factors are analyzed to explain their impact on the respondent's views.

2. *Company-Characteristics*: The company characteristics are considered with respect to both financial as well as non-financial parameters.

(a) Non-financial: Sector, Year of incorporation and industry.

(b) Financial: Apart from paid-up capital that has been taken as a measure of size of the company, Return on Equity (Profit after Interest, Taxes and Preference Dividend/ Equity Capital employed), has been taken as an overall measure of its performance.

The financial parameters used in the study are taken as an average of the values for five years.

4. Results and Discussion

This section presents the practices relating to some of the operational aspects of e-commerce in the large manufacturing firms in India.

4.1 Characteristics of the Companies and the Respondents

Table 1 and Table 2 present, at a glance, the profile of the respondents and their organizations. The majority of the respondents are professionally qualified with specialization in information technology. Since most of them are less than 45 years of age, they have experience up to 20 years and may be more conversant with information technology and the related e-commerce issues. Most of the companies are private sector

⁶ Prowess is a corporate database prepared and monitored by Centre for Monitoring Indian Economy.

companies scattered all over India with a blend of old and new organizations. The companies are large-sized and belong to different industries, thus giving a fair account of e-commerce scenario cutting across various industrial sectors. Such a diversified sample is likely to enrich our understanding of various e-commerce related issues.

Table 1: Characteristics of the Executives

Characteristic	Count	Per Cent
Age (years)		
Below 35	31	34.4
35-45	39	43.3
45-55	14	15.6
55 & Above	06	6.7
Total Experience (years)		
Below-10	23	25.6
10-20	44	48.9
20-30	18	20.0
30 & Above	05	5.6
Present Experience (years)		
Below-10	53	58.9
10-20	29	32.2
20-30	07	07.8
30 & Above	01	01.1
Qualification		
Graduate	12	13.3
Post Graduate	12	13.3
Professionals	66	73.3
Specialization		
IT	75	83.3
Any Other	15	16.7
Computer Education		
Formal (Outside/ In-house)	75	83.3
Informal (Friends/ Colleagues/ Others)	15	16.7

Source: Based on Questionnaire

Table 2: Characteristics of the Companies

Characteristic	Count	Per Cent
Year of Incorporation		
Before 1965	42	46.7
1965-1985	27	30.0
After 1985	21	23.3
Sector		
Public	08	08.9
Private	82	91.1
Industry		
Electrical and Electrical Products	14	15.6
Iron and Steel Alloys	17	18.9
General Engineering	12	13.3
Chemicals, Dyes and Pharmaceuticals	25	27.8
Rubber Tyre	03	03.3
Tea	04	04.4
Miscellaneous	15	16.7
Paid-Up Capital (Rs. Crore)		
Below 16	30	33.3
16-50	30	33.3
Above 50	30	33.3
Return on Equity (Per Cent)		
Below 23.81	30	33.3
23.81-30.05	30	33.3
Above 30.05	30	33.3

Source: Based on Questionnaire

4.2 Types of E-Commerce

The operational issues in e-commerce are contingent upon the e-intensity of an enterprise's functioning. The companies use e-commerce for its intra-business applications, Business-to-Customer/Consumer (B2C) or Business-to-Business (B2B) transactions. The customer may be an individual or an organization. Business-to-Business (B2B) refers to the relationship between two or more companies, or between suppliers and manufacturers or between business partners. In general, operational issues would depend upon the presence of a company in the cyberspace.

Almost all the firms used computer networking for intranet, Business-to-Customer/Consumer (B2C) or Business-to-Business (B2B) transactions. Some of them used it for all the three purposes. Only a few companies (2.4 per cent) are early starters and installed the computer network even before 1980. This might have provided them some

cutting edge over their competitors. More than two-thirds (72.6 per cent) of the companies have installed computer network during the period 1990-2000. More than one-fourth of them have been incorporated even before 1955. This may be due to the fact that after being in business for a long time, these companies have generated enough funds for meeting the high costs of installation of computer networks. Also, they might be feeling the need for change in the organization. The period of installation of computer networks is significantly related to sector. Majority of the 'Private' sector companies have installed computer networks in the beginning of the e-revolution.

This suggests that in modern times, running business without the use of IT has become inconceivable. Only a few companies (2.2 per cent) do not have networking of computers installed although they are using computers in their offices. These companies either do not feel the need for networking or cost of networking is a limiting factor for them.

Majority of the firms (88.9 per cent) use intranet suggesting proliferation of the use of computer networks within the organizations by their employees for exchange of information between various departments/offices, thereby saving on time and cost of obtaining information. The use of computer networks for Intranet purposes is significantly related to qualification of the respondents and industry. Most of the companies using Intranet are from 'Chemical, Dyes and Pharma' industry. Almost all the companies using Intranet belong to 'Private' sector.

One-fourth of the companies use B2C, having online relationship with their customers. Some of the companies, though willing to use B2C, feel constrained in doing so because their customer profile is such that they do not have the necessary infrastructure. In case of B2C, all the companies (100 per cent) are from 'Private' sector. This may be due to lack of initiative from the government and typical pitfalls of bureaucracy associated with public sector. Majority of these companies have return on equity 'Above 30.05' indicating that the profitability position of the company may have an impact on huge investment in B2C. The use of computer networks for B2C purposes is very significantly related to return on equity.

Majority of the companies (56.7 per cent) use B2B, having online relationships with their suppliers/business associates. Almost all the companies doing B2B belong to 'Private' sector. Almost all the respondents have IT specialization. More than one-fourth (29.4 per cent) of the companies doing B2B belong to 'Iron and Steel Alloys' industry. The use of computer networks for B2B purposes is significantly related to specialization of the respondents, year of incorporation and industry.

In the opinion of the respondents, at present, many firms do not use e-commerce. However, during the next five years, almost all the firms in their industries would use it. With increased awareness and improvement in infrastructure facilities, the extent of the use of e-commerce is likely to go up.

Majority of the companies surveyed have outsourced developing of e-commerce system in their organizations. Those companies, which preferred to install e-commerce system in-house, have done so with the help of their IT Departments. In some companies, committees are constituted to have better coordination in developing the systems according to the departmental requirements.

4.3 Benefits

E-commerce can benefit the business organizations in many ways. The use of computer networks for B2C provides easier access to the consumers for getting information, communication, quick processing of the order and provides more satisfaction to the customer. B2B leads to increase in the overall profitability through better material purchases, inventory control, reduction in waste, time management and resource planning.

Majority of the respondents (60 per cent) feel exchange of information to be the major benefit within the company. Most (92.6 per cent) of these respondents have experience up to 20 years within the same organization. More than three-fourths (79.6 per cent) of the respondents have professional qualification and have 'IT' as their specialized field of activity. Many companies (37.5 per cent) belonging to 'Chemical, Dye and Pharma' industry have considered this benefit important.

It suggests that the major benefit of e-commerce to a company for its internal functioning is the exchange of information followed by communication, time saving and cost reduction. Some managers feel that e-commerce has resulted in better monitoring, control of production and sales activities. Also, it results in better planning, decision-making and follow-up because of computer networks. The other benefits in the opinion of managers are automation of finance processes, inviting tenders from website, faster recovery from customers, resource sharing, reliability, better management of working capital, improvement in the quantity of work and engagement of quality work.

The saving in cost and time due to use of e-commerce system by the organizations is significantly related to computer education of the respondents. The better planning through e-commerce system by the organizations is significantly related to present experience of the respondents.

The benefits of using e-commerce for B2C in a company, in the opinion of the managers, are the creation of website and easy availability of information, both to customer and the company, better reach to customers through online systems, and more satisfaction to consumers. The other benefits are e-mail and communication, and quick processing of the order given by the customer. In some companies, it is also possible to reduce cost by arranging for e-bidding. Some customers also sent suggestions and feedback through computer networks.

For most of the companies using computer networks for B2C purposes, having a website and availability of information to the customer is the most important benefit. Majority of the responding companies belong to 'Private' sector and have paid up capital of more than ₹16 crores. It seems that these companies are actively using their website for attracting new customers and maintaining relations with the existing customers. The chi-square analysis also shows that the presence of website and availability of information through e-commerce system is significantly related to paid-up capital.

For the purpose of B2B, the computer networks are being used for availability of information and reports online, better time management and workflow, communication, material purchases and inventory controls. This has resulted in cost reduction, better acceptability and transparency of the system.

The major benefit perceived for B2B purpose includes availability of information about various aspects of business activities and its status while dealing with different business partners. About one-half (48 per cent) of these respondents belong to companies having paid up capital between '₹16 crore and 50 crore'. A large majority of such companies has high return on equity 'Above 23.81'. All the respondents have 'IT' as their specialization. The availability of information and reports through e-commerce system is significantly related to specialization of the respondents. The material purchase through e-commerce system is significantly related to present experience of the respondents and return on equity. The time management through e-commerce system shows significant relationship to total experience and qualification of the respondents.

Some of the other areas where computer networks are being used by the organizations, as suggested by 13.5 per cent of the respondents, are plant maintenance, integration of various applications, integration of dealers, forecasting and online query through extranet (network for selected groups of organizations), and inter-office communication. One of the major uses of computer networks by a leading company has been the development of

“e-chaupal” for about 200 villages that have been connected on-line by the company. These villages are the major suppliers of raw material to the company. So, the internet connection has been provided at the panchayat house of the villages where farmers can find out the latest price being offered in the international market and accordingly make a decision to supply to the company concerned. About one-third (30.8 per cent) of these companies belong to ‘Chemical, Dyes and Pharma’ industry. More than two-thirds belong to private sector. These other advantages of e-commerce system to the organizations are significantly related to age of the respondents and sector.

4.4 Problems Encountered during Shifting to E-Mode

Contrary to general apprehension, many companies faced no problems at the time of shifting to e-commerce mode. This response is significantly related to qualification of the respondents. However, there are some minor hiccups due to lack of knowledge about system-related information, infrastructure or understanding with vendors or consumers regarding use of e-commerce and industry standards. The resistance faced by the companies at the stage of introduction of e-commerce is significantly related to nature of the industry. The system related problems and training issues faced by the companies at the stage of introduction of e-commerce are significantly related to computer education and experience of the respondents.

Once the system is established, companies by and large do not face any problem in operating e-commerce systems except that some companies come across system-related problems coupled with rigid attitude of employees. The response that there is no problem at the operating stage of e-commerce is significantly related to qualification of the respondents, sector and paid-up capital.

4.5 Pitfalls of E-Commerce

Some of the pitfalls of using computer networks, according to the respondents, are slow speed and connection problems, virus, hacking, security, inflexibility and lack of secrecy. A few of the firms experienced dysfunctional behavior of their employees due to over dependence on computers. This opinion is expressed by two-thirds (68 per cent) of the respondents having professional qualification. A large majority (84 per cent) has ‘IT’ as their specialization and 60 per cent of them have ‘Formal’ education in computers. Despite their ability to handle information technology, security aspects are important to reduce the risk factor because of the on-going attacks of new viruses and hackers.

Specifically, while using computer networks for intranet purposes, a few companies (18.5 per cent) feel there are no disadvantages. A majority of such respondents is between '35-45' years age group, has 'Formal' computer education and is specialized in the area of 'IT'.

A few executives considered virus and hacking to be the main disadvantage of using computer networks in the organization. Forty per cent of these respondents belong to the age group 'Below 35'. The response that virus and hacking is major disadvantage of using computer networks for intranet purposes is significantly related to present experience and return on equity. Some companies experienced the problem of breaches in security.

The other disadvantages are using computers for personal work, over-dependence on computers, and dissatisfaction due to sharing of knowledge by others. One manager informed that whenever the server of their main service provider is down, there is agitation from employees and disruption of work, blaming the system for everything, creating behavioral problems. This suggests an over-dependence on computers. In the opinion of another manager, "It is not as flexible as manual system. Sometimes changes in policy may require a lot of changes in software and so there is wastage of all earlier software." Another manager felt that sometimes it becomes very confusing since lot of data floats around.

The response was also obtained on disadvantages of using the computer network for purposes other than intranet. For B2C, some (40 per cent) managers feel that there are many disadvantages. Most of these respondents belong to the age group 'Below 35' years and have experience of 'Below 10' years in the present organization as well as total experience. When the computer network is used for B2C purposes, respondents feel that competitor can tap information and there is a problem of security. Also in those organizations where personal relationship is important, B2C e-commerce is not successful, as one never sees the customer face to face in the latter case. Also, customers can't directly see the sample of the product. The user education is important in such organizations. In the opinion of one of the executives, maintenance is costly in the case of B2C because the organization has to keep changing the design of the web to attract clients, which is not required for B2B site. Visual appearance is important for B2C site. The response regarding disadvantages of using computer networks for B2C purposes is significantly related to paid-up capital and industry.

For B2B purposes also, some (48 per cent) company executives feel many disadvantages. When the computer network is used for B2B, there is a greater requirement of transparency and sharing of information which, in respondents' view, may be misused.

There is lack of flexibility in the system. Also, there is a tendency to blame the system for every problem. Apart from these limitations, e-contracts are fraught with a host of legal problems.

A majority of these respondents is between '35-45' years of age, having '10-20' years of total experience, but 'Below 10' years of experience in the present organization. The response regarding disadvantages of using computer networks for B2B purposes is significantly related to computer education of the respondents and industry.

A few (12 per cent) managers feel that there is a risk of over dependence of managerial decisions on data and information at the expense of wisdom and judgment, a situation that is referred to as "paralysis by analysis". Also there is problem of hacking, connectivity, and the dependence on specialized people for the use of network. The enterprise-wide risk management, therefore, has to grapple with the issue of technological dependence.

4.6 Positive Changes due to E-Commerce

Notwithstanding these attendant ill-effects, e-commerce more than outweighed in correspondence with existing clients, ordering of material and coordination with sub-contractors/vendors, use of website for attracting new clients, coordination with product dealers and better public relations with customers.

Specifically, the shifting to e-mode has resulted in increase in revenues, decrease in raw material and inventory cost, better vendor/supplier communications, more transmission of documents through e-mode. There has been increase in number of clients and direct client interaction after shifting to e-commerce mode. There is improvement in the attitude of employees and tele/video conferencing facilities are also being developed by the companies. E-mode has positively impacted the imports and exports of companies. An overall improvement in business, ultimately leading to industrial growth, has been recorded. In the international market, there has been time and cost reduction, global outsourcing and marketing, competitive pricing and bidding, culminating ultimately into widening of markets. Apart from the companies surveyed, their supplier/vendors, clients/ consumers are also computer savvy and users of e-commerce mode.

The decrease in raw material cost with e-commerce is significantly related to computer education of the respondents. The decrease in inventory cost is significantly related to computer education of the respondents and paid-up capital. The change in company's imports with e-commerce is significantly related to industry. The increase in customers with

the introduction of e-commerce is significantly related to paid-up capital and industry. The impact is more in 'General Engineering' and 'Iron and Steel Alloys' industry. The increase in interaction with customers with the introduction of e-commerce is significantly related to industry. The use of tele/video conferencing is significantly related to ownership pattern and return on equity. The improvement in the attitude of employees with e-commerce is significantly related to present experience of the respondents and return on equity.

The impact of shifting to e-mode on suppliers/vendors is significantly related to paid-up capital and industry. Most of the suppliers of 'Iron and Steel Alloys' industry are e-sophisticated, followed by 'Electrical and Electrical Product' and 'Chemical, Dyes and Pharma'. The impact of shifting to e-mode on clients is very significantly related to industry.

The distribution of sales to end users directly shows significance with industry. The distribution of sales to end users through distributors is significantly related to age and total experience of the respondents.

4.7 Challenges

While developing and installing, e-commerce system, a company has to face number of challenges. In India, there is lack of proper infrastructure needed for developing e-commerce systems. The cost of installation is high. There are problems related to local language and other specific local requirements. The laws are not clear about some of the aspects related to e-commerce. These, along with many other aspects, pose a great challenge to any company deciding to start e-commerce.

The opinions of company executives were obtained regarding the challenges they faced, or feel that they will have to face, if their organizations decide to develop e-commerce systems. The major challenge faced by the companies in developing e-commerce system in India is the 'gaps in the telecommunication infrastructure'. Lack of proper infrastructure dissuades many companies to develop e-commerce systems. Even if they shift to e-mode, the organizations are not able to take full advantage of the technology. The second major challenge seems to be the 'cost factor'. The cost of installation of e-commerce systems is very high. Also, running or maintenance cost is high, as there are frequent changes in the technology leading to early obsolescence of the computers and their software.

It seems that the companies are experiencing difficulties in finding good content developers for their e-commerce systems and installation costs is still prohibitive. Given the lingual diversity of India, the companies also seem to be in dilemma as to in what language

they should get their content developed. If e-commerce has to flourish in India, there has to be a greater penetration of internet as well as market for the hardware for its proliferation. Other major hurdles are legal issues, limited internet access and hardware availability.

In the US also, some of the biggest challenges in developing e-commerce system, identified by the participants, were higher cost justification, knowing needs of customers, finding experts to develop the system, understanding the method of operating the system, lack of willingness on the part of corporate management, resistance to change and compatibility with existing marketing systems (Miller, 2000). Another study also found that the top five challenges experienced by the firms to achieving e-business strategic objectives were organizational change, business process redesign/system integration hurdles, lack of e-business expertise, difficulties in matching technology to business needs, and security concerns (PRTM, 1999).

An earlier study in India found that the main barriers to the adoption of e-commerce included the lack of proper legal framework, infrastructure, awareness about technology and benefits, favourable environment (low industry initiative/Government support), understanding of new business environment, and organizational commitment on employee skill development (Indian Market Research Bureau, 2000).

Whenever any new technology or change is introduced, the company should be aware of the potential hazards that it will have to face. This prepares the organization to face the problems, which are going to arise and to handle them efficiently. For introducing e-commerce, being a new concept, it is all the more important for the company to be prepared for the potential market pitfalls. The companies should be prepared in advance for such eventualities whenever they decide to shift to e-mode.

Payment problems and legal aspects of e-commerce are the other aspects about which company should be aware of. Payment gateways through e-commerce are still not sophisticated enough. Also, the existing laws are not sufficient to deal with all types of e-commerce activities. The legal aspects of e-commerce are significantly related to sector.

Other problems are also mentioned by the managers in the firms, like 'power shortage and need to take backups', 'lack of faith and acceptability by the general public', 'doubt about the useful life of technology', 'lack of tax infrastructure', 'excessive dependence on networks', 'absence of standards for e-commerce documents and transactions', and 'translation problems'. Some of the responding executives also think that where personal involvement with the client is desired, e-commerce is not effective.

4.8 Suitability

It is generally felt that some industries are more suitable for doing business electronically than others. In the opinions of the respondents regarding the industries more suitable for e-commerce, there is no specific industry about which one can say that it is not suitable for e-commerce at all. Any manufacturing industry is as suitable for e-commerce as service industry. The extent of e-commerce or the model of e-commerce may vary from industry-to-industry depending on the nature of product and other specific requirement of industry. For example, B2C may be more suitable in certain cases as compared to B2B. But there is no business organization in which there is no use of any kind of e-commerce.

The most suitable industry for adopting e-commerce, in the opinion of corporate executives, is consumer goods industry, followed by service and engineering industries. Consumer goods industry is more suitable for e-commerce because of direct link with the consumer and B2C may be useful to these companies. The opinion that service industry is more suitable for e-commerce is significantly related to return on equity.

4.9 Future

It is expected that, in future, according to the responding managers, improvement in infrastructure, speed and e-payments will make the situation better. As the benefits of e-commerce are getting unlocked, the use of this mode is increasing in every industry.

The infrastructure development about e-commerce in near future is significantly related to present experience of the respondents and sector. Better speed and awareness of e-commerce in near future is significantly related to qualification and present experience of the respondents.

The speedier transaction cycle as the major advantage to industry due to advances in e-commerce systems is significantly related to sector. The opinion about better communication as the major advantage to industry due to advances in e-commerce systems is significantly related to ownership pattern.

Majority of the respondents expect an improvement in the overall business with these developments. The improvement in business as the major advantage due to advances in e-commerce systems is significantly related to present experience, qualification, specialization of the respondents and industry.

At the macro level, higher industrial growth, due to reduction in cost and total cycle time of business activities, is expected with the advancements in the e-commerce system.

Most of the company executives expect an increase in competition from international firms as networking has widened the scope of marketing and availability of information to the customer. The effect of e-commerce on competitions from international firms is significantly related to industry. Most of the companies which expect increased competition from international firms due to e-commerce have paid-up capital 'Above Rs.50 crore' and belong to 'Chemical, Dyes and Pharma' and 'Iron and Steel Alloys' industries.

5. Conclusions

The e-commerce has rolled on despite some inadequacies. At the same time, India has fallen well short of harnessing the fullest possible utilization of the technology that has turned on the entire universe of industry, trade and commerce. There are certain issues such as cost, speed, connectivity, security and investment in e-infrastructure that need to be addressed so that the actual potential of e-commerce may be realized in India. There is also a need to strengthen the infrastructural facilities and promoting e-commerce environment. Further advances in e-security, connectivity, and e-payment systems are required to facilitate the growth of e-commerce. Greater awareness about the potential benefits of e-commerce will further enhance its use in the world of business.

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